<u>Amendments to the Claims:</u>

This listing of the claims will replace all prior versions and listings of claims in the application:

<u>Listing of Claims:</u>

1 (Currently Amended): A layer structure for crystallographically orienting a layer of a hexagonal close-packed (*hcp*) material formed thereon, comprising, in overlying sequence:

(a) a first crystalline layer of a material having a first lattice parameter and a strong preferred growth orientation;

(b) a second crystalline layer of a material having a second lattice parameter and the same strong preferred growth orientation as said first crystalline layer; and

(c) a third crystalline layer of a *hcp* material having a lattice parameter similar to or different from said second lattice parameter of said second crystalline layer and a strong preferred growth orientation;

wherein said second crystalline layer has a lower interfacial energy with said first crystalline layer and a higher interfacial energy with said third crystalline layer, owing to a lower surface energy of said first crystalline layer and a higher surface energy of said second crystalline layer<u>, and</u>

<u>said second crystalline layer has a melting temperature (T_m) not less than about 2,100 °C</u>.

2 (Original): The layer structure as in claim 1, wherein:

said lower surface energy of said first crystalline layer is not greater than about 2.0 J/m^2 and said higher surface energy of said second crystalline layer is not less than about 2.7 J/m^2.

3 (Original): The layer structure as in claim 1, wherein:

said third crystalline layer of a *hcp* material has a [0002] lattice parameter similar to or different from said second lattice parameter of said second crystalline layer and a strong <0002> preferred growth orientation.

4 (Canceled)

5 (Original): The layer structure as in claim 1, wherein:

said first crystalline layer has a melting temperature (T_m) not greater than about 2,100 °C.

6 (Canceled)

7 (Original): The layer structure as in claim 1, wherein:

said first crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Al, Ag, Au, Cu, Zn, Ni, Ti, Pd, Pt, Mg, Ca, Be, Sc, Sr, La, Zr, Rh, Cd, Tl, Pb, Se, Te, Gd, Nd, Pr, Tb, Dy, Ho, Er, Tm, Yb, Lu, Mn, Fe, Cr, and alloys thereof.

8 (Currently Amended): The layer structure as in claim 1, wherein:

said second crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Ru, Re, Ir, Os, ~~Co, Pt, Ti,~~ Hf, ~~Th, Gd,~~ Mo, Nb, Ta, W, and alloys thereof.

9 (Original): The layer structure as in claim 1, wherein:

said third crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Ru, Co, CoCr, CoCrPt, and alloys thereof.

10 (Original): The layer structure as in claim 1, further comprising:

(d) a layer comprised of an amorphous or nano-crystalline material beneath said first crystalline layer.

11 (Original): The layer structure as in claim 10, wherein:

said amorphous or nano-crystalline layer comprises a material having short range order and mean nearest neighbor atomic spacing with a value similar to the nearest neighbor atomic spacing of said first crystalline layer.

12 (Original): The layer structure as in claim 11, wherein:

said amorphous or nano-crystalline layer comprises an amorphous or nano-crystalline metal or metal alloy selected from the group consisting of: Ti, TiCr alloys, other Ti-based alloys, Ta-based alloys, FeCoB alloys, FeCo alloys, FeNi alloys, and CoNi alloys.

13 (Original): The layer structure as in claim 1, wherein:

said first crystalline layer comprises an *fcc* material and said first lattice parameter is a [111] lattice parameter;

said second crystalline layer comprises an *hcp* material wherein said second lattice parameter is similar to said first [111] lattice parameter of said first crystalline layer; and

said third crystalline layer comprises a different *hcp* material with a lattice parameter similar to or different from that of said second crystalline layer.

14 (Withdrawn): The layer structure as in claim 1, wherein:

said first crystalline layer comprises an *fcc* material and said first lattice parameter is a [111] lattice parameter;

said second crystalline layer comprises a different *fcc* material with a second [111] lattice parameter similar to or different from said first [111] lattice parameter of said first crystalline layer; and

said third crystalline layer comprises an *hcp* material with a lattice parameter similar to said second [111] lattice parameter of said second crystalline layer.

15 (Withdrawn): The layer structure as in claim 1, wherein:

said first crystalline layer comprises, in overlying sequence, a layer of an amorphous or nano-crystalline metal or metal alloy having short range order and a mean nearest neighbor atomic spacing similar to a desired mean nearest neighbor atomic spacing for said first crystalline layer, and a crystalline layer of an *fcc* material wherein said first lattice parameter is a [111] lattice parameter;

said second crystalline layer comprises a different *fcc* material with a second [111] lattice parameter similar to or different from that of said first [111] lattice parameter of said first crystalline layer; and

said third crystalline layer comprises an *hcp* material with a lattice parameter similar to said second [111] lattice parameter of said second crystalline layer.

16 (Withdrawn): The layer structure as in claim 1, wherein:

said first crystalline layer comprises an *hcp* material;

said second crystalline layer comprises a different *hcp* material with a second lattice parameter similar to or different from that of said first lattice parameter of said first crystalline layer; and

said third crystalline layer comprises another different *hcp* material with a lattice parameter similar to or different from that of said second lattice parameter of said second crystalline layer.

17 (Withdrawn): A perpendicular magnetic recording medium, comprising the layer structure of claim 3 and an overlying perpendicular magnetic recording layer comprising a magnetic material with a strong <0002> growth orientation.

18 (Withdrawn): The magnetic recording medium as in claim 17, wherein:

said perpendicular magnetic recording layer with a strong <0002> growth orientation comprises a Co-based alloy.

19 (Withdrawn): A perpendicular magnetic recording medium, comprising:

(a) a non-magnetic substrate having a surface; and

(b) a layer stack formed over said substrate surface, said layer stack comprising, in overlying sequence from said substrate surface:

(i) a magnetically soft underlayer;

(ii) an interlayer structure for crystallographically orienting a layer of a hexagonal close-packed (*hcp*) perpendicular magnetic recording material formed thereon; and

(iii) an *hcp* magnetically hard perpendicular main recording layer;

wherein said interlayer structure comprises, in overlying sequence from a surface of said magnetically soft underlayer:

(1) a first crystalline layer of a material having a first lattice parameter and a strong preferred growth orientation;

(2) a second crystalline layer of a material having a second lattice parameter and the same strong preferred growth orientation as said first crystalline layer; and

(3) a third crystalline layer of an *hcp* material, having a [0002] lattice parameter similar to or different from that of said second lattice parameter of said second crystalline layer and a strong <0002> preferred growth orientation; and

said second crystalline layer has a lower interfacial energy with said first crystalline layer and a higher interfacial energy with said third crystalline layer, owing to a lower surface energy of said first crystalline layer and a higher surface energy of said second crystalline layer.

20 (Withdrawn): The recording medium as in claim 19, wherein:

said lower surface energy of said first crystalline layer is not greater than about 2.0 J/m^2 and said higher surface energy of said second crystalline layer is not less than about 2.7 J/m^2.

21 (Withdrawn): The recording medium as in claim 19, wherein:

said second lattice parameter of said second crystalline layer is similar to or different from said first lattice parameter of said first crystalline layer;

said first crystalline layer has a melting temperature (T_m) not greater than about 2,100 °C; and

said second crystalline layer has a melting temperature (T_m) not less than about 2,100 °C.

22 (Withdrawn): The recording medium as in claim 19, wherein:

said first crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Al, Ag, Au, Cu, Zn, Ni, Ti, Pd, Pt, Mg, Ca, Be, Sc, Sr, La, Zr, Rh, Cd, Tl, Pb, Se, Te, Gd, Nd, Pr, Tb, Dy, Ho, Er, Tm, Yb, Lu, Mn, Fe, Cr, and alloys thereof;

said second crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Ru, Re, Ir, Os, Co, Pt, Ti, Hf, Th, Gd, Mo, Nb, Ta, W, and alloys thereof; and

said third crystalline layer is from about 1 to about 50 nm thick and comprises at least one material selected from the group consisting of: Ru, Co, CoCr, CoCrPt, and alloys thereof.

23 (Withdrawn): The recording medium as in claim 19, further comprising:

(c) a layer intermediate said interlayer structure and said magnetically soft interlayer, comprised of an amorphous or nano-crystalline metal or metal alloy having short range order and mean nearest neighbor atomic spacing with a value similar to the nearest neighbor atomic spacing of said first crystalline layer, selected from the group consisting of: Ti, TiCr alloys, other Ti-based alloys, Ta-based alloys, FeCoB alloys, FeCo alloys, FeNi alloys, and CoNi alloys.

24 (Withdrawn): The recording medium as in claim 19, wherein said interlayer structure is selected from the group consisting of:

structure (1), wherein said first crystalline layer (a) comprises an *fcc* material and said first lattice parameter is a [111] lattice parameter; said second crystalline layer comprises an *hcp* material wherein said second lattice parameter is similar to said first [111] lattice parameter of said first crystalline layer (a); and said third crystalline layer comprises a different *hcp* material with a third lattice parameter similar to or different from that of said second crystalline layer;

structure (2), wherein said first crystalline layer comprises an *fcc* material and said first lattice parameter is a [111] lattice parameter; said second crystalline layer comprises a different *fcc* material with a second [111] lattice parameter similar to or different from said first [111] lattice parameter of said first crystalline layer; and said third crystalline layer comprises an *hcp* material with a lattice parameter similar to said second [111] lattice parameter of said second crystalline layer;

structure (3), wherein said first crystalline layer comprises, in overlying sequence, a layer of an amorphous or nano-crystalline metal or metal alloy having short range order and a mean nearest neighbor atomic spacing similar to a desired mean nearest neighbor atomic spacing for said first crystalline layer, and a crystalline layer of an *fcc* material wherein said first lattice

parameter is a [111] lattice parameter; said second crystalline layer comprises a different *fcc* material with a second [111] lattice parameter similar to or different from that of said first [111] lattice parameter of said first crystalline layer; and said third crystalline layer comprises an *hcp* material with a lattice parameter similar to said second [111] lattice parameter of said second crystalline layer; and

structure (4), wherein said first crystalline layer comprises an *hcp* material; said second crystalline layer comprises a different *hcp* material with a second lattice parameter similar to or different from that of said first lattice parameter of said first crystalline layer; and said third crystalline layer comprises another different *hcp* material with a lattice parameter similar to or different from that of said second lattice parameter of said second crystalline layer.

25 (Withdrawn): The recording medium as in claim 19, wherein:

said non-magnetic substrate comprises at least one material selected from the group consisting of Al, NiP-plated Al, Al-Mg alloys, other Al-based alloys, other non-magnetic metals, other non-magnetic alloys, glass, ceramics, polymers, glass-ceramics, and composites and/or laminates thereof;

said magnetically soft underlayer is an amorphous metal material comprised of Fe containing at least one element selected from the group consisting of Co, B, P, Si, C, Zr, Nb, Hf, Ta, Al, Cu, Ag, and Au; and

said magnetically hard perpendicular main recording layer includes at least one layer of an *hcp* <0002> growth-oriented ferromagnetic material comprised of Co containing at least one element selected from the group consisting of Pt, Cr, Ta, B, Cu, W, Mo, and Nb.

26 (New): A layer structure for crystallographically orienting a layer of a hexagonal close-packed (*hcp*) material formed thereon, comprising, in overlying sequence:

(a) a first crystalline layer of a material having a first lattice parameter and a strong preferred growth orientation;

(b) a second crystalline layer of a material having a second lattice parameter and the same strong preferred growth orientation as said first crystalline layer; and

(c) a third crystalline layer of a *hcp* material having a lattice parameter similar to or different from said second lattice parameter of said second crystalline layer and a strong preferred growth orientation;

wherein said second crystalline layer has a lower interfacial energy with said first crystalline layer and a higher interfacial energy with said third crystalline layer, owing to a lower surface energy of said first crystalline layer and a higher surface energy of said second crystalline layer,

said second crystalline layer comprises an *hcp* material,

said third crystalline layer comprises a different *hcp* material, and

said second crystalline layer comprises at least one material selected from the group consisting of: Ru, Re, Ir, Os, Co, Pt, Hf, Th, Gd, Mo, Nb, Ta, W, and alloys thereof.